

Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims presented in the above-identified application:

1. (currently amended) A system for assaying one or more targets in a sample, comprising:
 - (a) an assay device having one or more assay sets at least one for each target to be assayed, each of the assay sets comprising at least two electrodes and a recognition moiety immobilized to one or more of the at least two electrodes, the recognition moiety being capable of specific binding to a component of one of the targets selected from the group consisting of a bacterium, a virus, and a cell;
 - (b) an electric or electronic module arranged and configured to measure electric conductance between the at least two electrodes of each assay set; and
 - (c) reagents formulated to deposit a conductive substance onto a complex formed between said recognition moiety and said target, wherein the reagents comprise: (i) a solution comprising nucleation-center forming entities for binding to said target if said target is present in the sample; and (ii) a combination of metal ions and a reducing agent to allow formation of said conductive substance on said entities, and wherein the conductive substance, when deposited onto the complex, forms a conductive bridge between the at least two of the electrodes of a set.
2. (canceled)
3. (previously presented) A system according to Claim 1, wherein said reagents comprise:
 - (i) one or more reagents to allow deposition and/or formation of said nucleation center-forming entities on a complex formed between said recognition moiety and said target; and
 - (ii) a combination of metal ions and a reducing agent to allow formation of said conductive substance from said entities.

4. (previously presented) A system according to Claim 1, wherein said nucleation-center forming entities are colloid particles.
5. (previously presented) A system according to Claim 1, wherein said nucleation-center forming entities are metal complexes, clusters, or complexes and clusters.
6. (original) A system according to Claim 4, wherein said colloid particles are colloid gold particles.
7. (previously presented) A system according to Claim 5, wherein said metal complexes or clusters are gold complexes or gold clusters.
8. (original) A system according to Claim 4, wherein said colloid particles are colloid platinum particles.
9. (previously presented) A system according to Claim 5, wherein said metal complexes or clusters are platinum complexes or platinum clusters.
- 10.-17. (canceled)
18. (previously presented) A system according to Claim 1, comprising a plurality of assay sets of electrodes.
19. (original) A system according to Claim 18, wherein all assay sets of electrodes are for assaying the same target.
20. (original) A system according to Claim 18, wherein different assay sets of electrodes or different groups of assay sets are for assaying different targets.
21. (original) A system according to Claim 20, for simultaneous determination at different targets in a sample.

22. (previously presented) A system according to Claim 1, when the target is a protein or polypeptide and the recognition moiety is a protein-binding molecule which specifically binds to the target protein.

23. (original) A system according to Claim 22, wherein said recognition moiety is an antibody or antibody fraction comprising at least the antigen-binding domain of the antibody.

24. (currently amended) A method for assaying one or more biological molecule targets in a sample comprising:

(a) providing an assay device having one or more assay sets at least one for each target to be assayed, each of the assay sets comprising at least two electrodes and a recognition moiety immobilized to one or more of the at least two electrodes, the recognition moiety being capable of specific binding to one of the targets;

(b) contacting said assay device with said sample under conditions permitting binding of targets to specific recognition moieties to form a complex;

(c) contacting said assay device with reagents to deposit a conductive substance onto the complex formed between said recognition moiety and said target, such that the conductive substance deposits onto the complex and forms a conductive bridge between said at least two electrodes;

(d) connecting said at least two electrodes to an electric or electronic module to measure conductance between said at least two electrodes; and

(e) determining conductance between said at least two electrodes, conductance above a threshold conductance indicating the presence of a respective target in the sample.

25. (currently amended) A method for assaying one or more biological molecule targets in a sample, comprising;

(a) reacting the sample targets with a first reagent solution to bind nucleation center-forming entities to said targets;

(b) providing an assay device having one or more assay sets at least one for each target to be assayed, each of the assay sets comprising at least two electrodes and a

recognition moiety immobilized to one or more of the at least two electrodes, the recognition moiety being capable of specific binding to one of the targets;

(c) contacting said assay device with said sample under conditions permitting binding of targets to specific recognition moieties;

(d) contacting said device with a second reagent solution to form a conducting metal substance over said nucleation center-forming entities for a time sufficient to yield a conductive bridge between said at least two electrodes;

(e) connecting said at least two electrodes to an electric or electronic module to measure conductance between said at least two electrodes; and

(f) determining conductance between said at least two electrodes, conductance above a threshold conductance indicating the presence of a respective target in the sample.

26. (currently amended) A method for assaying one or more biological molecule targets in a sample, comprising:

(a) providing an assay device having one or more assay sets at least one for each target to be assayed, each of the assay sets comprising at least two electrodes and a recognition moiety immobilized to one or more of the at least two electrodes, the recognition moiety being capable of specific binding to one of the targets;

(b) contacting said assay device with said sample under conditions permitting binding of targets to specific recognition moieties;

(c) contacting said device with a first reagent solution comprising monomers of a conductive polymer such that said monomers can bind to complexes formed between the targets and recognition moieties;

(d) treating said device such that said monomers will polymerize to form a conducting polymer, such that upon polymerization of the monomers a conductive bridge between the at least two electrodes of at least one set is formed; and

(e) determining a conductance between said at least two electrodes, conductance above a threshold conductance indicating the presence of a respective target in the sample.

27. (previously presented) A method according to Claim 26, comprising before step (a) reacting the sample with a second reagent solution containing entities which can form

nucleation centers for growing therefrom a conductive polymer from said monomers, such that said entities bind to said targets if present in the sample.

28. (previously presented) A method according to Claim 26, comprising after step (a) contacting said assay device with a second reagent solution containing entities which can form nucleation centers for growing therefrom a conductive polymer from said monomers, such that said entities bind to said targets if bound to said recognition moieties.

29. (currently amended) A method according to Claim 24, wherein said targets are nucleic acid sequences molecules and the recognition moieties are oligonucleotides, each of which has a sequence which is complementary to one of the sequences a nucleic acid molecule of said targets target.

30. (canceled)

31. (currently amended) A kit for use in assaying one or more targets in a sample, comprising:

(a) an assay device having one or more assay sets at least one for each target to be assayed, each of the assay sets comprising at least two electrodes and a recognition moiety immobilized to one or more of the at least two electrodes, the recognition moiety being capable of specific binding to a component of one of the targets selected from the group consisting of a bacterium, a virus, and a cell; and

(b) reagents formulated to deposit a conductive substance onto a complex formed between said recognition moiety and said target, wherein the reagents comprise: (i) a solution comprising nucleation-center forming entities for binding to said target if said target is present in the sample; and (ii) a combination of metal ions and a reducing agent to allow formation of said conductive substance on said entities, and wherein the conductive substance, when deposited onto the complex, forms a conductive bridge between the at least two of the electrodes of a set.

32. (canceled)

33. (previously presented) A kit according to Claim 31, where said reagents comprise:

- (i) one or more reagents to allow deposition, formation, or deposition and formation of said nucleation-center forming entities on a complex formed between said recognition moiety and said target; and
- (ii) a combination of metal ions and a reducing agent to allow growth of said conductive substance on said entities.

34. (canceled)

35. (currently amended) An electronic device for determining one or more targets in a sample, comprising:

an integrated circuit comprising a first group of N_1 conductors and a second group of N_2 conductors, defining between them $N_1 \times N_2$ junctions, each such junction being formed with an electronic module comprising two electrodes, each one linked to or defined as an integral portion of one of the conductors, and comprises a diode or non-linear component permitting current flow through the electronic module only in the direction from the first group of conductors to the second group of conductors whereby a current flowing between one conductor of the first group to one conductor of the second group of conductors defines a single junction point between them; each pair of electrodes forming part of an assay set, each assay set having a recognition moiety for binding to a component of a target selected from the group consisting of a bacterium, a virus, and a cell, bound to at least one of the electrodes and reagents formulated to deposit a conductive substance onto a complex formed between said recognition moiety and said target, wherein said reagents comprise: (i) a solution comprising nucleation-center forming entities for binding to said target if said target is present in the sample; and (ii) a combination of metal ions and a reducing agent to allow formation of said conductive substance on said entities.

36. (previously presented) A device according to Claim 35, wherein distance of center of one assay set to a center of an adjacent assay set is 100 μm or less.

37. (currently amended) An electric device for determining one or more targets in a sample comprising:

a microelectronic device having a plurality of layers, with a first group of conductors being defined as stripes in one or more first layers and a second group of conductors being defined as stripes in one or more second layers of the device with each of said second layers being separated from a first layer by a non-conductive substance, electrodes of the device being formed as open ends of the conductors by openings or cut-outs in a vertical direction through the layers;

each pair of electrodes forming part of an assay set, each assay set having a recognition moiety for binding to a component of a target selected from the group consisting of a bacterium, a virus, and a cell bound to at least one of the electrodes and reagents formulated to deposit a conductive substance onto a complex formed between said recognition moiety and said target, wherein said reagents comprise: (i) a solution comprising nucleation-center forming entities for binding to said target if said target is present in the sample; and (ii) a combination of metal ions and a reducing agent to allow formation of said conductive substance on said entities.

38. (previously presented) A system according to Claim 18, wherein the device is an electronic device for determining one or more targets in a sample, comprising:

an integrated circuit comprising the first group of N_1 conductors and a second group of N_2 conductors, defining between them the $N_1 \times N_2$ junctions, each such junction being formed with an electronic module comprising two electrodes, each one linked to or defined as an integral portion of one of the conductors, and comprises a diode or non-linear component permitting current flow through the electronic module only in the direction from the first group of conductors to the second group of conductors, whereby a current flowing between one conductor of the first group to the one conductor of the second group of conductors defines a single junction point between them; each pair of electrodes forming part of an array set, each array set having a recognition moiety bound to at least one of the electrodes.

39. (previously presented) A method according to Claim 24, wherein said device is an electronic device for determining one or more targets in a sample, comprising:

an integrated circuit comprising the first group of N_1 conductors and a second group of N_2 conductors, defining between them $N_1 \times N_2$ junctions, each such junction being formed with an electronic module comprising two electrodes, each one linked to or defined as an integral portion of one of the conductors, and comprises a diode or non-linear component permitting current flow through the electronic module only in the direction from the first group of conductors to the second group of conductors, whereby a current flowing between one conductor of the first group to one conductor of the second group of conductors defines a single junction point between them; each pair of electrodes forming part of an array set, each array set having a recognition moiety bound to at least one of the electrodes.

40. (canceled)

41. (original) A method for detecting one or more targets in a sample by multiplexing comprising:

- (i) contacting the electronic device of Claim 35 with the sample under conditions enabling binding of the targets to recognition moieties; and
- (ii) determining conductance in each assay set.

42. (canceled)

43. (previously presented) A system according to Claim 1, wherein said one or more targets are one or more nucleic acid sequences.

44. (previously presented) A system according to Claim 43, wherein said recognition moiety is an oligonucleotide having a sequence complementary to at least a portion of sequence of one of said one or more targets.

45. (previously presented) A method according to claim 24, further comprising contacting said assay device with a first reagent solution to form nucleation-center forming entities for depositing onto or binding to complexes formed between a target and a recognition moiety.

46. (canceled)

47. (new) A method according to Claim 25, wherein said targets are nucleic acid molecules and the recognition moieties are oligonucleotides, each of which has a sequence which is complementary to a nucleic acid molecule of said target.

48. (new) A method according to Claim 26, wherein said targets are nucleic acid molecules and the recognition moieties are oligonucleotides, each of which has a sequence which is complementary to a nucleic acid molecule of said target.

49. (new) A method according to Claim 24, wherein said targets are selected from the group consisting of a bacterium component, a virus component, and a cell component.

50. (new) A method according to Claim 25, wherein said targets are selected from the group consisting of a bacterium component, a virus component, and a cell component.

51. (new) A method according to Claim 26, wherein said targets are selected from the group consisting of a bacterium component, a virus component, and a cell component.

52. (new) A kit according to Claim 31, wherein said recognition moiety is a nucleic acid molecule.

53. (new) An electronic device according to Claim 35, wherein said recognition moiety is a nucleic acid molecule.

54. (new) An electric device according to Claim 37, wherein said recognition moiety is a nucleic acid molecule.